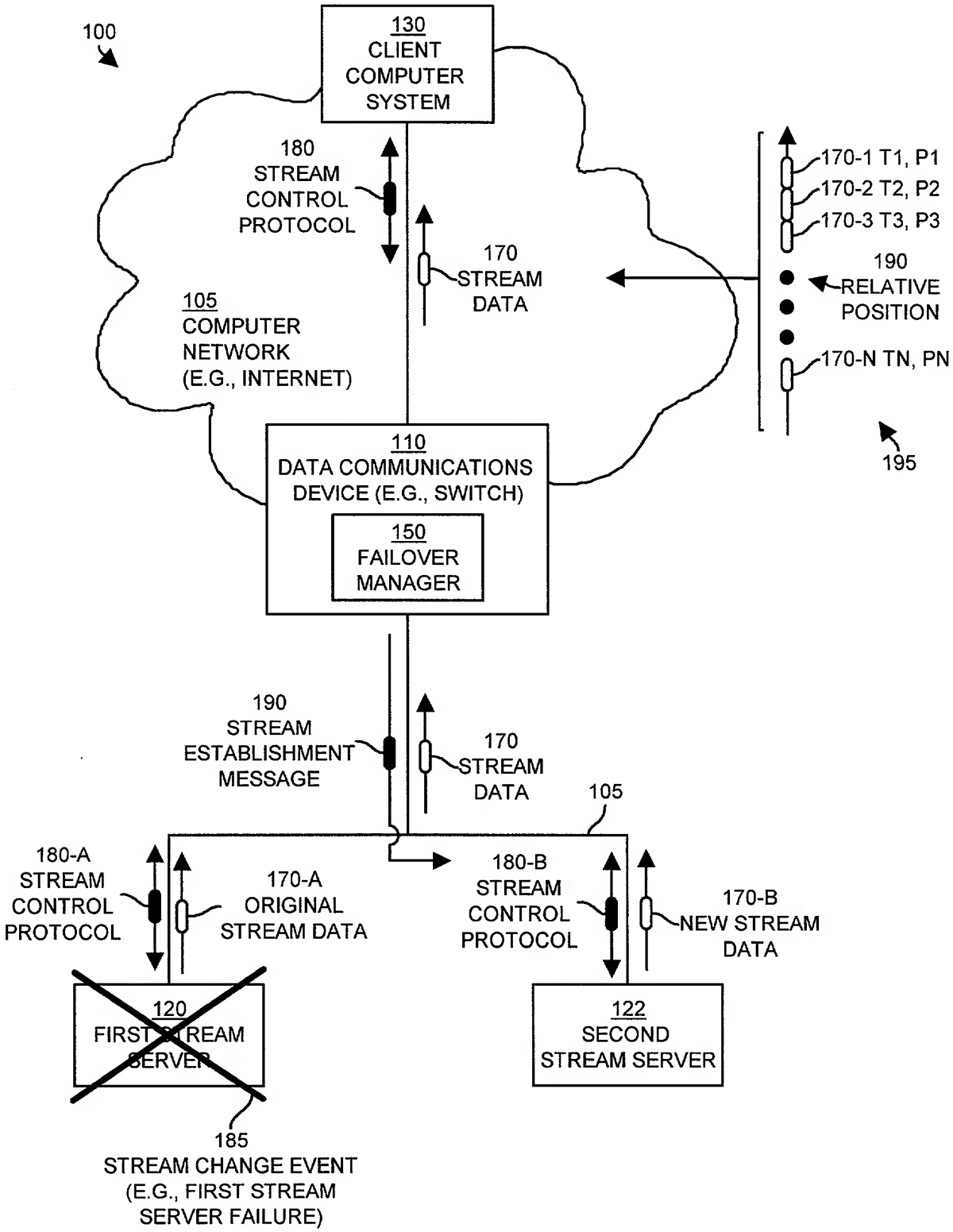
100
130
CLIENT
COMPUTER
SYSTEM
180
STREAM
CONTROL
PROTOCOL
170
STREAM
DATA
105
COMPUTER
NETWORK
(E.G., INTERNET)
170-1 T1, P1
170-2 T2, P2
170-3 T3, P3
190
RELATIVE
POSITION
170-N TN, PN
195
110
DATA COMMUNICATIONS
DEVICE (E.G., SWITCH)
150
FAILOVER
MANAGER
190
STREAM
ESTABLISHMENT
MESSAGE
170
STREAM
DATA
105
180-A
STREAM
CONTROL
PROTOCOL
170-A
ORIGINAL
STREAM DATA
180-B
STREAM
CONTROL
PROTOCOL
170-B
NEW STREAM
DATA
120
FIRST STREAM
SERVER
122
SECOND
STREAM SERVER
185
STREAM CHANGE EVENT
(E.G., FIRST STREAM
SERVER FAILURE)

FIG. 1

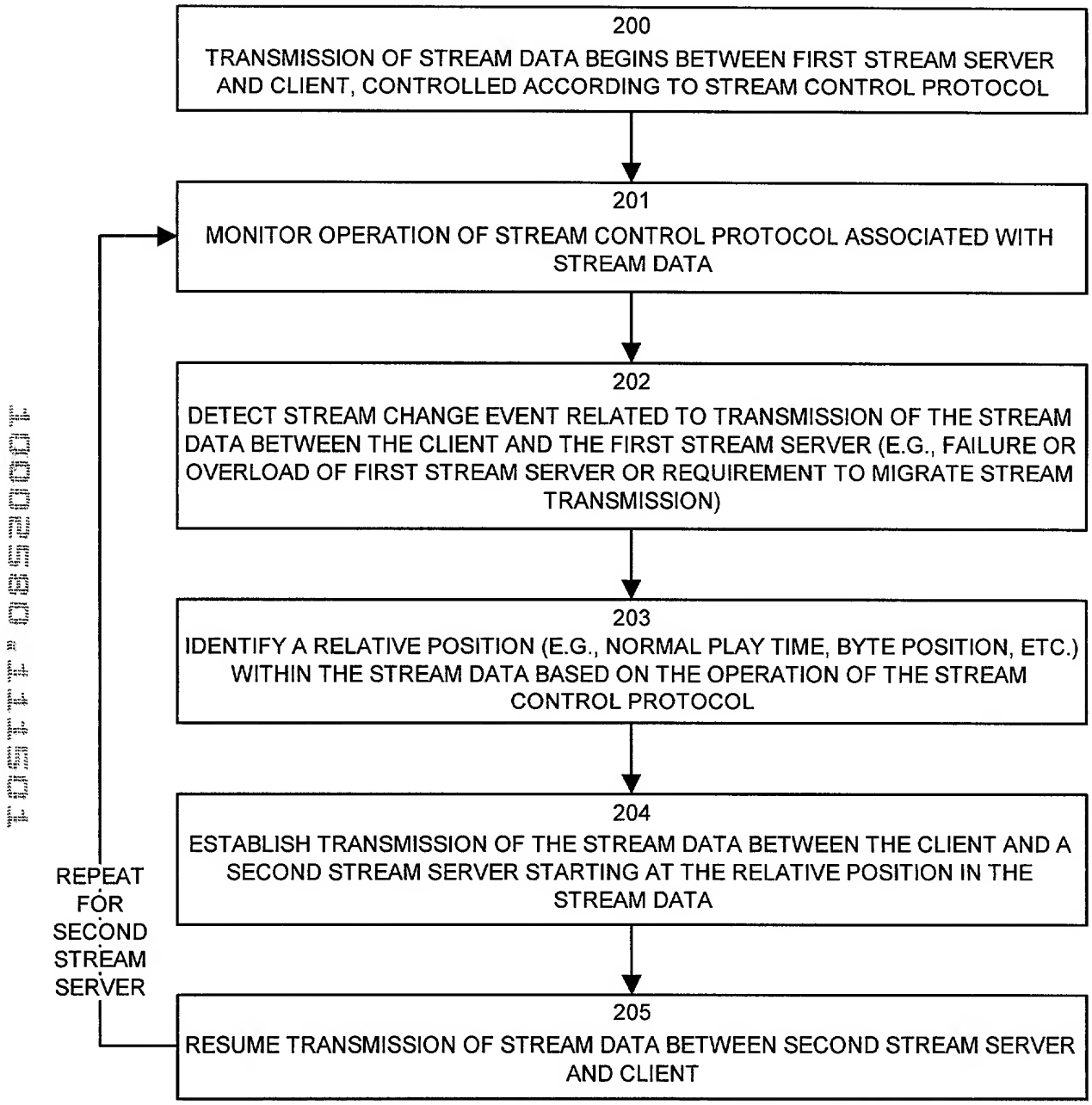
200
TRANSMISSION OF STREAM DATA BEGINS BETWEEN FIRST STREAM SERVER AND CLIENT, CONTROLLED ACCORDING TO STREAM CONTROL PROTOCOL
201
MONITOR OPERATION OF STREAM CONTROL PROTOCOL ASSOCIATED WITH STREAM DATA
202
DETECT STREAM CHANGE EVENT RELATED TO TRANSMISSION OF THE STREAM DATA BETWEEN THE CLIENT AND THE FIRST STREAM SERVER (E.G., FAILURE OR OVERLOAD OF FIRST STREAM SERVER OR REQUIREMENT TO MIGRATE STREAM TRANSMISSION)
203
IDENTIFY A RELATIVE POSITION (E.G., NORMAL PLAY TIME, BYTE POSITION, ETC.) WITHIN THE STREAM DATA BASED ON THE OPERATION OF THE STREAM CONTROL PROTOCOL
204
ESTABLISH TRANSMISSION OF THE STREAM DATA BETWEEN THE CLIENT AND A SECOND STREAM SERVER STARTING AT THE RELATIVE POSITION IN THE STREAM DATA
205
RESUME TRANSMISSION OF STREAM DATA BETWEEN SECOND STREAM SERVER AND CLIENT
REPEAT FOR SECOND STREAM SERVER

FIG. 2

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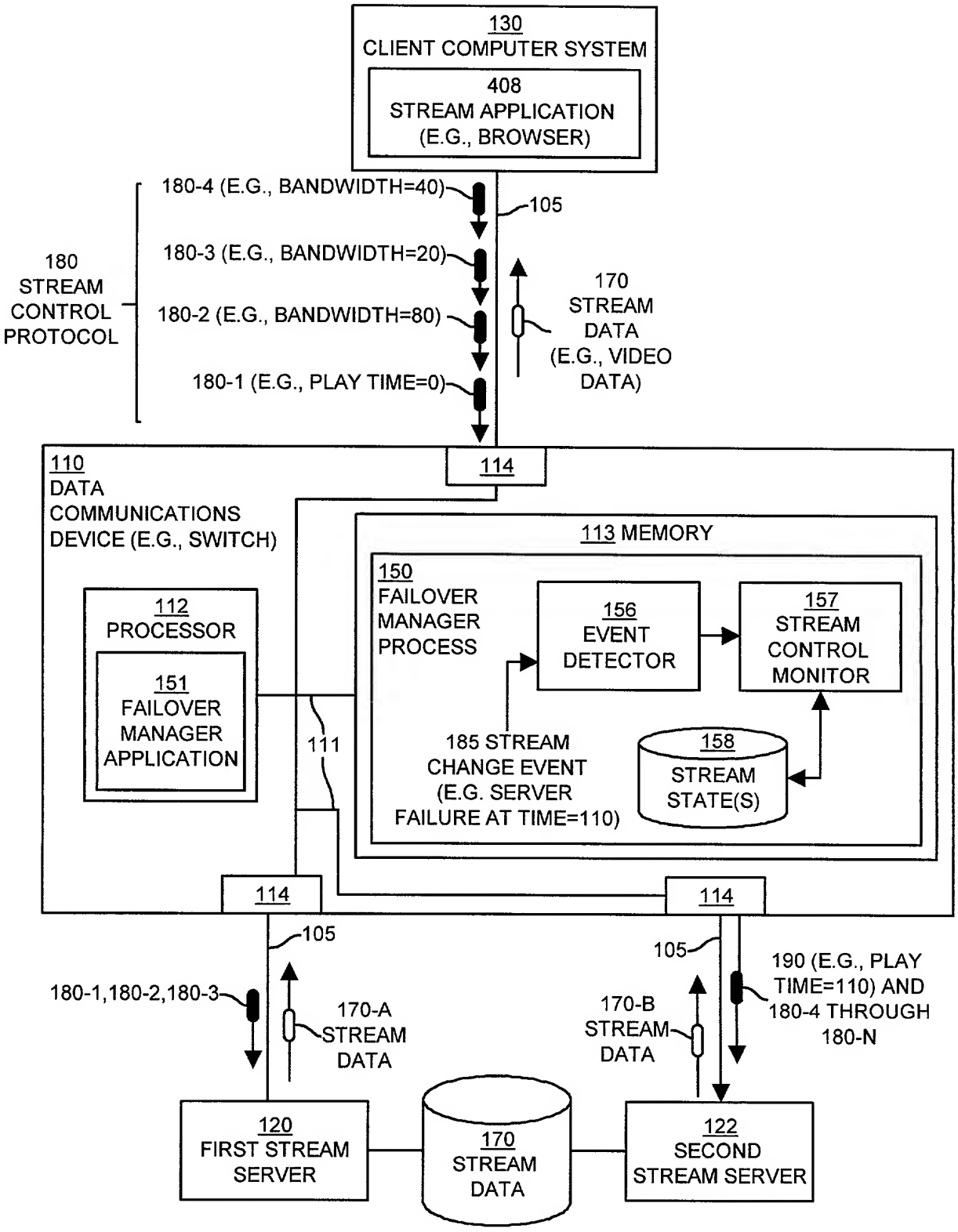

FIG. 3

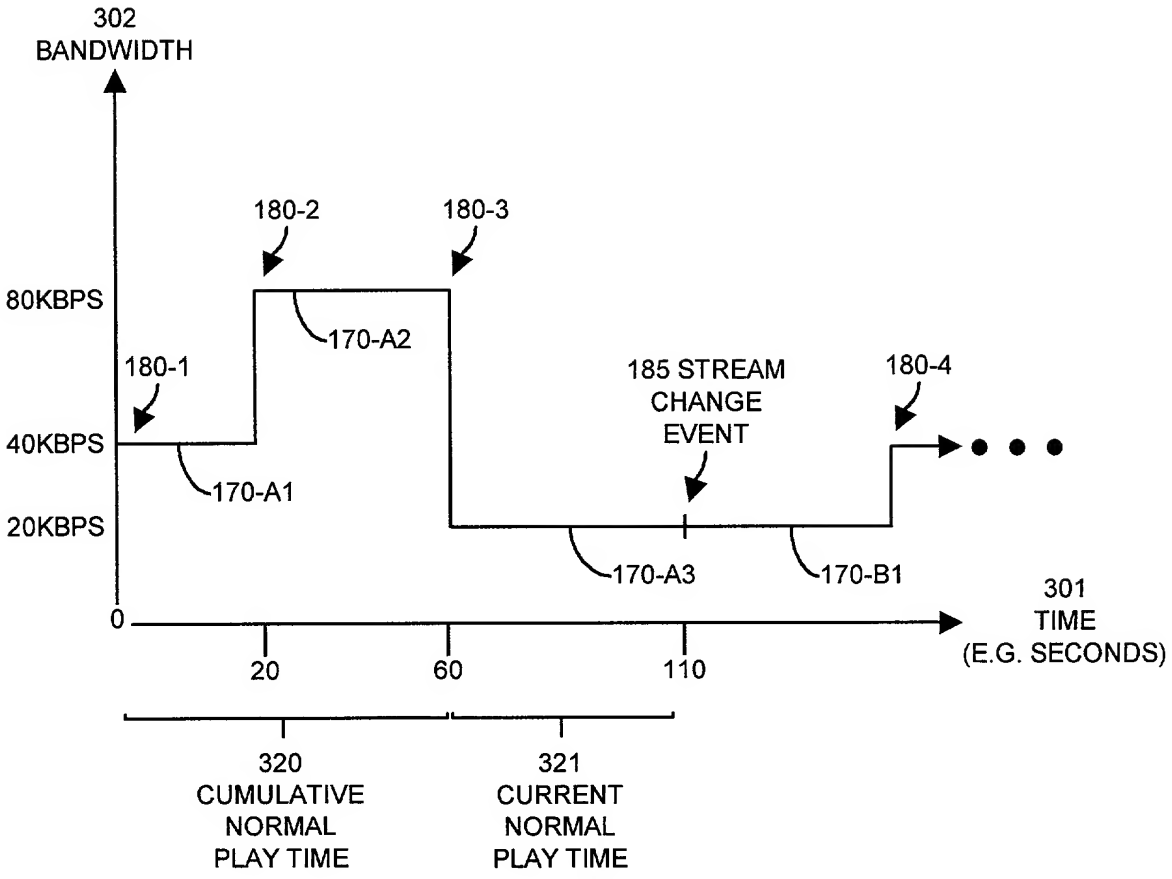
302
BANDWIDTH
180-2
180-3
80KBPS
170-A2
180-1
185 STREAM
CHANGE
EVENT
180-4
40KBPS
170-A1
20KBPS
170-A3
170-B1
0
301
TIME
(E.G. SECONDS)
20
60
110
320
CUMULATIVE
NORMAL
PLAY TIME
321
CURRENT
NORMAL
PLAY TIME

FIG. 4

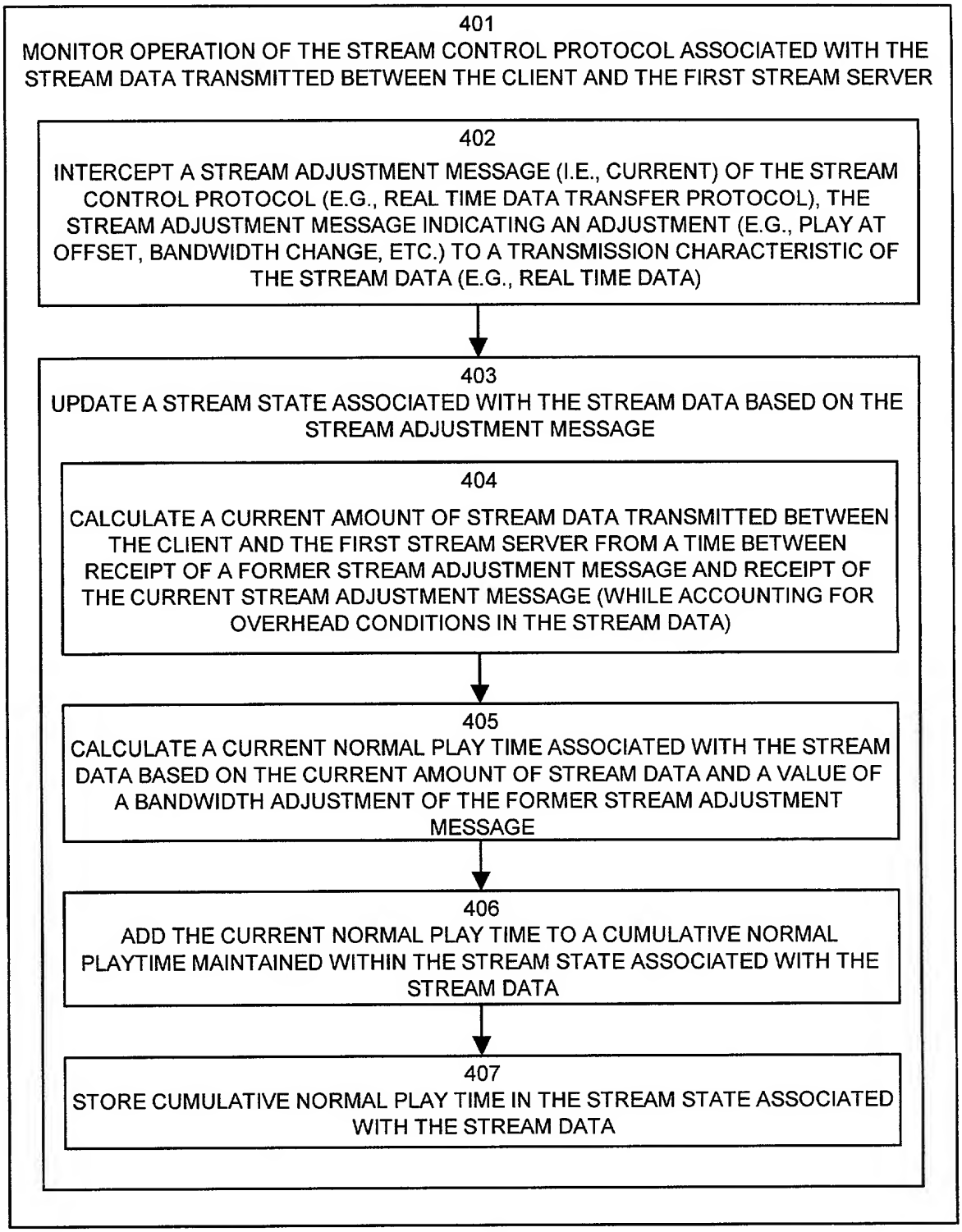
401
MONITOR OPERATION OF THE STREAM CONTROL PROTOCOL ASSOCIATED WITH THE STREAM DATA TRANSMITTED BETWEEN THE CLIENT AND THE FIRST STREAM SERVER
402
INTERCEPT A STREAM ADJUSTMENT MESSAGE (I.E., CURRENT) OF THE STREAM CONTROL PROTOCOL (E.G., REAL TIME DATA TRANSFER PROTOCOL), THE STREAM ADJUSTMENT MESSAGE INDICATING AN ADJUSTMENT (E.G., PLAY AT OFFSET, BANDWIDTH CHANGE, ETC.) TO A TRANSMISSION CHARACTERISTIC OF THE STREAM DATA (E.G., REAL TIME DATA)
403
UPDATE A STREAM STATE ASSOCIATED WITH THE STREAM DATA BASED ON THE STREAM ADJUSTMENT MESSAGE
404
CALCULATE A CURRENT AMOUNT OF STREAM DATA TRANSMITTED BETWEEN THE CLIENT AND THE FIRST STREAM SERVER FROM A TIME BETWEEN RECEIPT OF A FORMER STREAM ADJUSTMENT MESSAGE AND RECEIPT OF THE CURRENT STREAM ADJUSTMENT MESSAGE (WHILE ACCOUNTING FOR OVERHEAD CONDITIONS IN THE STREAM DATA)
405
CALCULATE A CURRENT NORMAL PLAY TIME ASSOCIATED WITH THE STREAM DATA BASED ON THE CURRENT AMOUNT OF STREAM DATA AND A VALUE OF A BANDWIDTH ADJUSTMENT OF THE FORMER STREAM ADJUSTMENT MESSAGE
406
ADD THE CURRENT NORMAL PLAY TIME TO A CUMULATIVE NORMAL PLAYTIME MAINTAINED WITHIN THE STREAM STATE ASSOCIATED WITH THE STREAM DATA
407
STORE CUMULATIVE NORMAL PLAY TIME IN THE STREAM STATE ASSOCIATED WITH THE STREAM DATA

FIG. 5

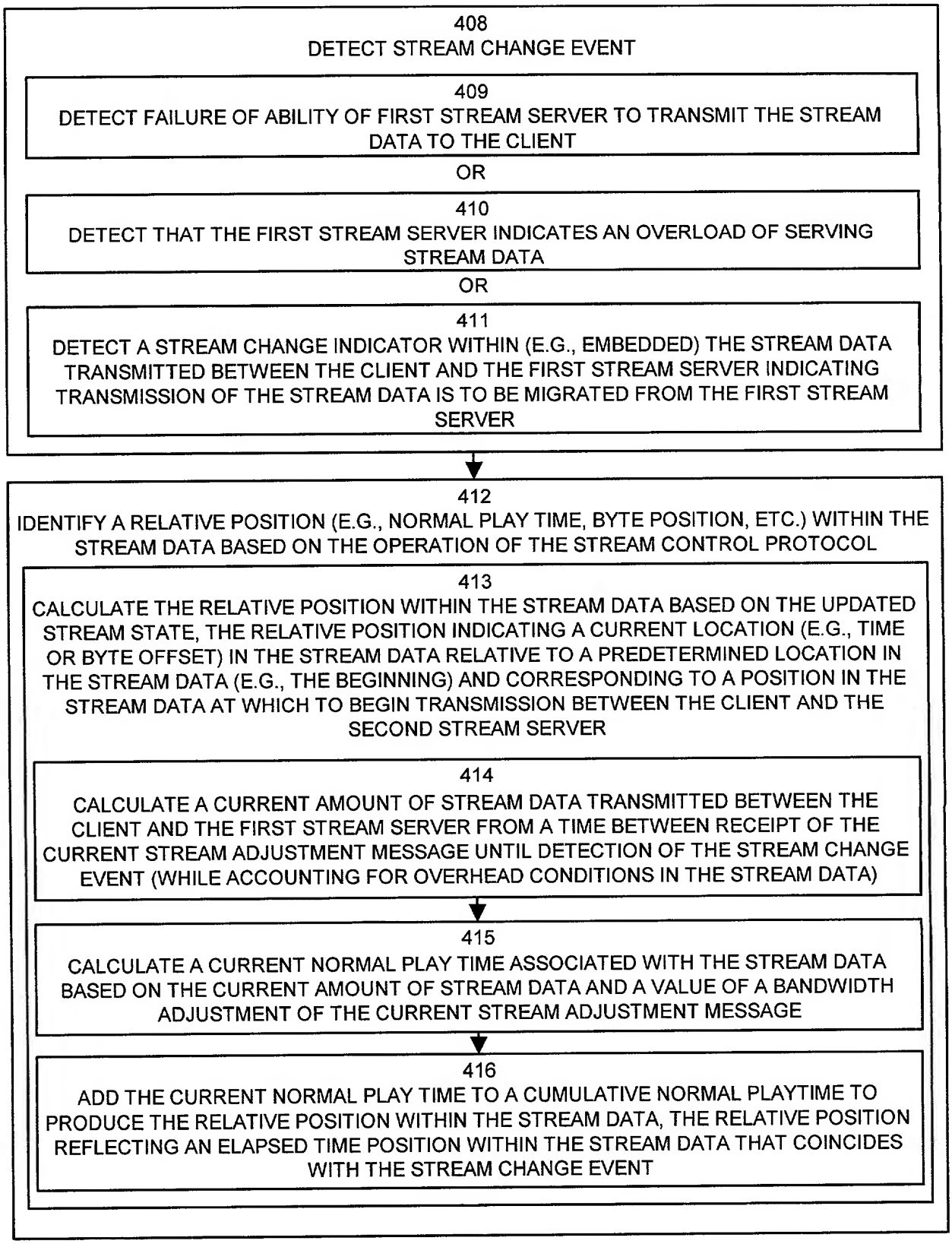
408
DETECT STREAM CHANGE EVENT
409
DETECT FAILURE OF ABILITY OF FIRST STREAM SERVER TO TRANSMIT THE STREAM DATA TO THE CLIENT
OR
410
DETECT THAT THE FIRST STREAM SERVER INDICATES AN OVERLOAD OF SERVING STREAM DATA
OR
411
DETECT A STREAM CHANGE INDICATOR WITHIN (E.G., EMBEDDED) THE STREAM DATA TRANSMITTED BETWEEN THE CLIENT AND THE FIRST STREAM SERVER INDICATING TRANSMISSION OF THE STREAM DATA IS TO BE MIGRATED FROM THE FIRST STREAM SERVER
412
IDENTIFY A RELATIVE POSITION (E.G., NORMAL PLAY TIME, BYTE POSITION, ETC.) WITHIN THE STREAM DATA BASED ON THE OPERATION OF THE STREAM CONTROL PROTOCOL
413
CALCULATE THE RELATIVE POSITION WITHIN THE STREAM DATA BASED ON THE UPDATED STREAM STATE, THE RELATIVE POSITION INDICATING A CURRENT LOCATION (E.G., TIME OR BYTE OFFSET) IN THE STREAM DATA RELATIVE TO A PREDETERMINED LOCATION IN THE STREAM DATA (E.G., THE BEGINNING) AND CORRESPONDING TO A POSITION IN THE STREAM DATA AT WHICH TO BEGIN TRANSMISSION BETWEEN THE CLIENT AND THE SECOND STREAM SERVER
414
CALCULATE A CURRENT AMOUNT OF STREAM DATA TRANSMITTED BETWEEN THE CLIENT AND THE FIRST STREAM SERVER FROM A TIME BETWEEN RECEIPT OF THE CURRENT STREAM ADJUSTMENT MESSAGE UNTIL DETECTION OF THE STREAM CHANGE EVENT (WHILE ACCOUNTING FOR OVERHEAD CONDITIONS IN THE STREAM DATA)
415
CALCULATE A CURRENT NORMAL PLAY TIME ASSOCIATED WITH THE STREAM DATA BASED ON THE CURRENT AMOUNT OF STREAM DATA AND A VALUE OF A BANDWIDTH ADJUSTMENT OF THE CURRENT STREAM ADJUSTMENT MESSAGE
416
ADD THE CURRENT NORMAL PLAY TIME TO A CUMULATIVE NORMAL PLAYTIME TO PRODUCE THE RELATIVE POSITION WITHIN THE STREAM DATA, THE RELATIVE POSITION REFLECTING AN ELAPSED TIME POSITION WITHIN THE STREAM DATA THAT COINCIDES WITH THE STREAM CHANGE EVENT

FIG. 6

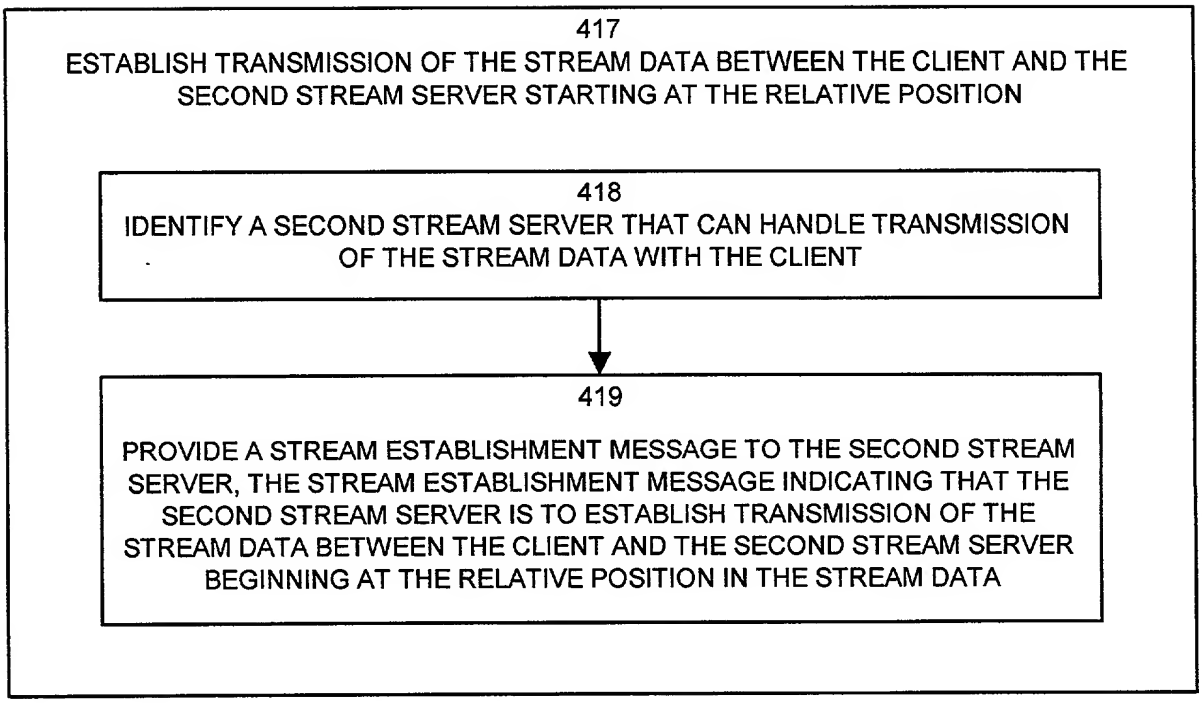
417
ESTABLISH TRANSMISSION OF THE STREAM DATA BETWEEN THE CLIENT AND THE SECOND STREAM SERVER STARTING AT THE RELATIVE POSITION
418
IDENTIFY A SECOND STREAM SERVER THAT CAN HANDLE TRANSMISSION OF THE STREAM DATA WITH THE CLIENT
419
PROVIDE A STREAM ESTABLISHMENT MESSAGE TO THE SECOND STREAM SERVER, THE STREAM ESTABLISHMENT MESSAGE INDICATING THAT THE SECOND STREAM SERVER IS TO ESTABLISH TRANSMISSION OF THE STREAM DATA BETWEEN THE CLIENT AND THE SECOND STREAM SERVER BEGINNING AT THE RELATIVE POSITION IN THE STREAM DATA

FIG. 7